Visits to Physicians Before and After Exposure to Urea Formaldehyde Foam Insulation

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Abstract: The average number of visits to a physician made by a sample of 351 residents of homes insulated with urea formaldehyde foam insulation in Montreal in the one year period before exposure was 5.25, and in the year following 5.62, an increase of 7 per cent (odds ratio 1.07, 95%CI=1.00,1.15). The increase in visits in the post insulation year was limited to subjects who had the product installed in the winter (OR=1.48, 95%CI=1.18,1.85), and was not seen for study subjects who insulated their homes during other seasons of the year. (*Am J Public Health* 1988; 78:1489–1491.)

Introduction

The possibility that exposure to urea formaldehyde foam insulation (UFFI) might be detrimental to good health was raised after publication, in late 1979, of preliminary results of a study reporting development of nasal carcinoma in rats.[1] By the summer of 1980 homeowners and the general public became concerned about the health effects of UFFI.[2] Studies of residents experiencing high frequencies of allergic reactions, difficulty breathing, nasal stuffiness, headaches, and running eyes were quickly reported in both the scientific[3–5] and lay press, and there was speculation about possible long-term effects: cancer and congenital abnormalities.

Canada and several states in the United States banned the use of UFFI in 1981. Estimates of the number of homes insulated with UFFI are 500,000 in the United States and 100,000 in Canada.

We assessed the health impact of UFFI installation by exploiting the historical records of a universal health insurance system several years after the date of installation of UFFI.

Methods

Study subjects were drawn from the lists of the applicants to a provincial program which offered financial assistance to remove UFFI from homes. Established in 1983, the program required that the "individual in the household most affected by UFFI" be examined by a physician and a report made. There were 2,393 applicants from Montreal. The last group of applicants (453) were not coded by the government agency and were excluded. From the remaining 1,940 applicants we drew a stratified random sample of 351 subjects by sex and 10-year age groups. All subjects gave consent that the information could be used for research purposes.

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Demographic information, date of UFFI installation, and Medicare number were obtained from the records of the government program. A subsequent telephone interview established if exposure to UFFI had ended at any time by moving out of the home with UFFI, by removal of UFFI, or through death.

Medical care utilization data were provided by the Régie de l'Assurance-Maladie du Québec (Régie), a universal health insurance system in Québec. Data were supplied for all instances of care received from November 1976 (when this particular type of data storage began) to January 1984. The physician visit required for application to the government program was excluded.

Paired t-tests and logistic regression analyses were done.[6] If the number of visits during two periods are Poisson random variables, then conditioning on the total number of visits during the two periods, the number of visits during one period is a binomial random variable with probability equal to the ratio of its Poisson mean to the sum of the two Poisson means. Thus if the mean number of visits are the same in the period before and after insulation, the proportion during the second period will be 0.5 and the odds ratio associated with exposure will be 1.0. Parameters for seasons of installation were included in the model to check whether the UFFI effect varied according to season of installation of UFFI.

We also adjusted for an annual baseline increase in number of visits to physicians by the general population of Quebec of about 3 per cent over the period of the study.[7] We took this into account by setting the offset in the logistic regression equal to the logit of 1.03, or $\log_e(103/203)/(1-103/203)$.[6]

Results

Of the total sample of 351, two residents were excluded because they had not insulated their homes with UFFI, five subjects because of coding errors, and seven with an unknown or incorrect Medicare number. Of the remaining 337 residents, 323 (96 per cent) completed the study interview (93 per cent of total sample of 349). All subjects with any missing information were excluded, leaving 303 subjects in the analysis (87 per cent of the initial 349 subjects selected for the study).

July 3, 1979 was the mean date of UFFI installation with most installations occurring in the 1978-80 period. The mean end of exposure date was April 1983 with a range of 1980 to 1984, when the final interviews were completed. The mean post exposure period was three years, nine months. The mean delay from time of UFFI installation to application for the assistance program was two and a half years.

Table 1 shows pre and post exposure period physician visits for study subjects. The average number of visits in the one year period before exposure to UFFI was 5.25, and in the year following UFFI installation was 5.62. The differences are accounted for by winter installations rather than installations in other seasons. The increase is most evident in the first and second seasons following initial exposure. Neither

TABLE 1—Mean Number of Visits and Mean Differences[a] (and standard deviation) for Frequency of Visits to a Physician in Various Seasons after Installation of Urea Formaldehyde Foam Insulation (UFFI)

Season since Exposure	Mean Number of Visits		Mean Differences[a] in Visits (and standard deviation)				
			All Seasons	Winter	Spring	Summer	Autumn
0	Pre-insulation	1.33	.01	0.26	−0.39	−0.03	0.30
	Post-insulation	1.34	(2.30)	(1.36)	(2.35)	(2.28)	(2.63)
1	Pre-insulation	1.20	0.23	0.54	0.29	0.13	0.19
	Post-insulation	1.43	(2.42)	(2.08)	(2.75)	(2.04)	(2.89)
2	Pre-insulation	1.45	0.03	0.71	0.02	0.11	−0.45
	Post-insulation	1.48	(2.84)	(1.84)	(2.63)	(3.11)	(2.85)
3	Pre-insulation	1.26	0.11	0.20	−0.02	−0.01	0.38
	Post-insulation	1.37	(3.19)	(1.59)	(2.55)	(2.08)	(5.28)
Year before		5.25	0.37	1.71	−0.10	0.20	0.42
Year after		5.62	(6.32)	(4.32)	(6.03)	(5.33)	(8.66)

a) Differences in comparison to the same person in the same season, before, and after UFFI exposure.

increases nor decreases in visits are evident for those who had UFFI installed at other times of the year.

This same pattern is seen in Table 2 where odds ratios are presented corresponding to different seasons of UFFI installation. The overall increase in visits after UFFi installation in the winter months is 48 per cent, corresponding to an odds ratio of 1.48 (95% confidence interval = 1.18,1.85). Inclusion of calendar year in the logistic regression model indicated no modification of the UFFI effect by calendar year.

After adjusting the model for the 3 per cent inflationary annual increase in number of visits by the general population, results showed the same pattern with all odds ratio estimates reduced by about 3 per cent. For example, odds ratios for winter were OR=1.43, spring OR=0.95, summer OR=1.02, and autumn OR=1.03.

Discussion

This study shows that utilization of physician services by residents of homes insulated with UFFI increased somewhat in the year following winter insulation (January, February, and March). UFFI installation at other times of the year did not show a similar pattern. While such an effect could be a sampling artefact, it is consistent with the findings that chemical exposure from UFFI may occur as a result of incomplete hardening of the insulation when it is installed in the colder months.[8] Also, chemicals may reach higher concentrations in the interior of homes when ventilation is minimized, as might be the case during the winter.[9–11]

Previous epidemiologic studies on the health effects of UFFI have been limited by the absence of comparison groups,[12,13] possible bias in reporting behavior due to use of self-reported symptoms as an outcome measure,[12–16] and the difficulty of attributing symptoms solely to one environmental exposure.[12–16] By using self-paired comparisons and an objective measure of health status, this study avoids some of these limitations.

Nevertheless, several potential biases may exist in the present study. The use of a sampling frame of homeowners who make use of a government assistance program is not representative. It is likely that self-selection of residents who perceived that they were suffering from exposure to UFFI led to an increased possibility of finding an apparent effect.

In addition, there may have been underreporting of physician visits. However, research on a similar system in Manitoba has shown that the fee-for-service scheme provides valid data on total physician-patient contacts.[17]

Finally, with the records provided, it was not possible to assess the diagnoses for subjects. Possibly only more "serious" health problems which would prompt a person to visit a physician were assessed in this study.

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TABLE 2—Odds Ratios[a] for Frequency of Visits to a Physician in Various Seasons after Exposure to UFFI

Season since Exposure	Season Installed				
	All Seasons	Winter	Spring	Summer	Autumn
0	1.01	1.35	0.76	0.97	1.17
1	1.19	1.68 (1.05, 2.68)	1.21	1.12	1.12
2	1.02	1.83 (1.17, 2.86)	1.01	1.09	0.78
3	1.09	1.17	0.99	0.99	1.23
Year after vs year before	1.07	1.48 (1.18, 1.85)	0.98	1.04	1.06

a) Odds ratios for frequency of visits after exposure in comparison to the same person, same season in the previous year, with the null hypothesis that the frequency of visits was equal for each season before and after exposure.
Note: 95% CI in parentheses.

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Wife's Level of Education and Husband's Risk of Primary Cardiac Arrest

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Abstract: Data from a case-control study were analyzed to examine wife's education and risk of primary cardiac arrest in the husband. Men whose wives had more than 12 years of education had 80 per cent the rate of men with less educated wives (odds ratio = 0.8, 95% confidence interval = 0.5, 1.3), after adjustment for risk factors. There was no evidence of a status incongruity effect. These data are inconsistent with reports of positive associations between wife's education and coronary heart disease. (*Am J Public Health* 1988; 78:1491–1493.)

Introduction

Data from the Framingham Study revealed that the risk of coronary heart disease among married men was positively associated with their wives' education.[1] Reports from other populations suggest that this association may apply especially to men who have low education or who demonstrate Type A behavior.[2,3] During the past 20 years, investigations of direct and indirect socioeconomic measures in the United States and Europe typically have found an inverse association with coronary heart disease,[4–9] so a positive relationship with wife's education is a notable exception and may reflect the impact of stress-inducing changes in women's social roles and marital expectations on the home environment.[1,2]

To provide further information on wife's education as a risk factor, we analyzed data from a community-based, case-control study of one major form of coronary heart disease, primary cardiac arrest (PCA). Because this study was restricted to married individuals, it offered the opportunity to examine associations involving wife's education, separately and in combination with husband's education.

Methods

The study design and methods have been described in detail elsewhere.[10,11] PCA was defined as a sudden, pulseless condition without evidence of non-cardiac cause.[12] All cases (fatal and non-fatal) of out-of-hospital PCA in King County, Washington between December 1979 and January 1981 were identified by trained paramedics. The study was restricted to 25-75 year old married residents of King County who had no history of clinically recognized heart disease or activity-limiting co-morbidity (e.g., chronic lung disease, musculoskeletal impairment). For all study subjects, information was obtained in home interviews with spouses. After each case was identified, a control subject meeting the same criteria for eligibility and matched for age (± 7 years), sex, and urban or suburban residence was chosen by random digit dialing.[13] Of eligible subjects identified, 89 per cent of case spouses and 85 per cent of control spouses agreed to participate, producing 163 case-control pairs. Eighty-two per cent of the case-control pairs were male, slightly over half were urban residents, and the average age of cases and controls was 58 and 57 years, respectively.

This analysis was restricted to the 133 male case-control pairs. Education of the men and their wives was classified as

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